Before the Federal Communications Commission Washington, D.C. 20554

In the Matter of)	
Amendment of Part 97 of the)	WT Docket No. 05-235
Commission's)	
Rules To Implement WRC-03)	
Regulations)	
Applicable to Requirements for)))	
Operator		
Licenses in the Amateur Radio Service		

REPLY TO COMMENTS

INTRODUCTION

There are a number of facts I would like to put on the record so that readers of this proceeding are not unduly influenced by statements made in error or ignorance by other commenters. While I am a member of a number of radio organizations, I have no position as officer or representative for these organizations. What follows are my personal opinions, and not those of any group or organization.

While some commenters purport to provide an *objective viewpoint* on these proceedings, they do not typically provide a balanced view of the situation. Like virtually every human being, their view of the world is colored by their experiences and background – as is mine. It is at times difficult to assign emotion (e.g. sarcasm) or bias to the written word, especially in short exchanges. Years ago, operating as a SYSOP¹ for a special interest group, I would see people in *violent agreement* arguing the same point from different aspects. One of our duties was to try and limit heated debate to the point of keeping people from overstepping the bounds of common courtesy and namecalling. It is very hard to take a neutral view of things when the topic is of interest to you, so until now I have refrained from replying to some of the error-prone or inflammatory statements made at times. After all, everyone is entitled to their opinions, and is invited to comment on this proceeding. There is no need to be a past or present licensed amateur radio operator, or even a *possible licensed hobbyist* to participate in these proceedings. Even sycophants can participate.

¹ SYStem OPerator – a title usually assigned to a user responsible for maintenance and control of a special interest group, or portion thereof.

DISCUSSION

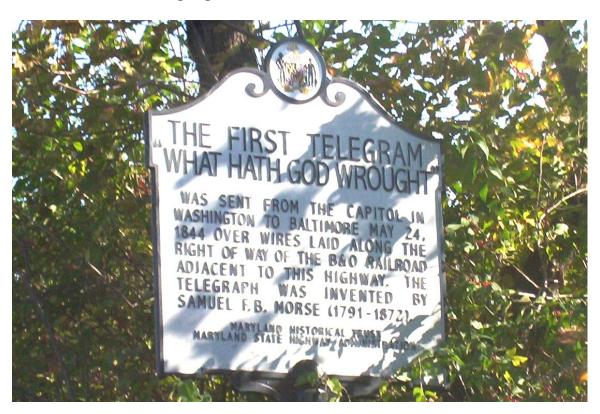
1. Telegraphy and Morse Code

Telegraphy has a long history in the United States, as it does in other parts of the world². It was the first "instant messaging" system, the first way to collect news or data in one location and then have it distributed hundreds to thousands of miles away with little delay. Morse code was initially a "code" as Samuel F. B. Morse had only developed symbols to represent the digits 0-9 and a code book in which the operator could look up the corresponding phrase. For example, 236 might represent 'have arrived safely'. Numbered radiogams are still used today to save time and increase accuracy, while remnants from the early railroad days, like 73, have long been part of our shorthand.

Alfred Vail, Morse's partner and the man responsible for most of the working hardware, came up with a character-based code that later became the American Morse Code. The current International Morse code, which is used for radiotelegraphy, is a modification of the Continental (Prussian) Morse code. Text in English is sent faster in American Morse than it is in

² The names of many of those contributing to the development of the electromagnetic telegraph are quite familiar. In approximately 1820 André-Marie Ampère suggested a deflecting needle telegraph system in France based on the magnetic field developed near a coil of conducting wire – with one needle for each letter! In England in 1824 William Sturgeon invented the electromagnet, which increased the strength of the field, but the problem was that so much current was required that losses through conductors of any reasonable length were so high as to make this unsuitable for a practical telegraph. Meanwhile, in America, Joseph Henry was experimenting with electromagnets wound with many turns and fine wire, his so called "intensity" magnet. By 1831 he had demonstrated the ability to ring a bell with an electromagnet powered through 1 mile of wire. In Germany, Gauss and Weber developed a telegraph system using their mirror galvonometer in 1833, but had little time to spend on development and enlisted the aid of Professor Steinheil of Munich University. Steinheil fashioned a recording system that deflected both left and right with response to change of current direction in about 1835, and while trying to extend the range of the system discovered the concept of the common "ground", which saved one wire in the system. Meanwhile, in Britain, William Cooke and Charles Wheatstone had patented their own needle telegraph system in 1837. Back in America, Morse, a painter and teacher of painting, had supposedly been thinking about a remote (tele) electromagnetic recording (graph) system since 1832, but could only get it to work 40 feet by 1835. Professor Leonard Gale suggested Morse read Henry's papers and use "intensity" magnets – they managed to reach 10 miles with this arrangement, and demonstrated a working telegraph in 1837 in New York. Alfred Vail witnessed the demonstration and became involved, turning Morse's pendulum marking device into the "register" which embossed dots and dashes on a strip of paper. This was the system that was demonstrated, at amongst other places, the Capitol in 1838, but it would be 5 years before they would receive federal funding to run the line between Washington and Baltimore. In 1844, "What hath God wroght", the "first telegram", was sent from Washington to Baltimore – it was *not* the first, but probably the most famous.

International Morse, which is based on the frequency of occurrence of letters in the German alphabet. This should not be too surprising, as aside from the Q-signals, a number radio abbreviations come from languages other than English, many from the early days of telegraphy or radio, such as O.K. (Oll Korrect – German) and MAYDAY (m'aidez – help me in French). With such internationally recognized prosigns and abbreviations, it is possible to conduct abbreviated contacts with amateurs in other parts of the world without a common language³.



You can't believe *everything* you read. This photo was taken a few miles from my home at a point where the rail line that provided the right-of-way for the telegraph wires is in close proximity to U.S. 1. The first use of the line was earlier in the month, before it was completed to Baltimore, when Vail telegraphed to the Capitol the news of Henry Clay's nomination by the Whig party.

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³ While there have been a number of Morse "alphabets" developed for different languages, the Q-signals and abbreviations remain as constants – perhaps cryptic in some languages, but then again most 2- or 3-character symbols are – even in English. Some simple examples are CQ, DE, <u>SK</u>, ES, etc. This is not much different from the somewhat cryptic commands in UNIX, something else that becomes second nature after longtime use. Languages based on phonemes (such as the Korean Hangul) can also be expressed as Morse symbols. Languages with iconography are more difficult, but this problem also exists in typewriters, and in digital means, other than image transmission - the Japanese Katakana "symbol" approach provides a solution.

2. The Amateur Radio Relay League (ARRL)

The ARRL is not the first radio club in the U.S., but it does represent more than amateurs than any other club, about 22.5% of the current U.S. licensees⁴. The International Amateur Radio Union (IARU) is the organization that represents amateur radio at the International Telecommunication Union (ITU), best known in this proceeding for its World Radiocommunication Conferences, the most recent in 2003 (WRC-03). ARRL is the IARU society representing the United States; in addition the ARRL has been elected to be the current IARU International Secretariat (IS). For comparative values, the JARL, Japan's IARU member society, representing the second largest group of hams in the world, has a membership that represents only 14% of Japan's licensees.

The ARRL is typical of many non-profit organizations, raising money for events while charging membership fees and selling publications. While the salaries paid are above the national average⁵, they are far from being excessive. The IRS, who was given the power in 1996 to fine or revoke the tax-exempt status of non-profit organizations whose executives were deemed to receive excessive compensation, keeps this in check. As a comparison to other non-profits, the top ten paid officers of the American Red Cross were compensated an average value of over \$270,000 per year.⁶ The American Diabetes Association has a large number of publications available to members and non-members (over 180 titles not including monthly and quarterly magazines). Their consumer membership numbers 435,000 – making them a large organization by anyone's accounting – and their management costs last year were over \$8 million, with over \$35 million spent on fund raising⁷. This pales in comparison to the Salvation Army who spent \$305 million on management & general expenses and \$127 million on fund raising⁸. Like most organizations, those at the top of ARRL management are mature and experienced people, with many years involvement with the organization.

⁴ Based on the biannual *Publishers's Sworn Statement* by ARRL and the Amateur Radio Station License data available on Joe Speroni's web site

⁽http://www.ah0a.org/FCC/index.html) which has historical data extracted from the FCC data bases. This is the site mentioned in the NPRM&O and allows one, to close enough values, to have a measure of the number of pre-*Restructuring* Amateur Extra licensees. Based on the numbers, it is estimated that 30% of current Amateur Extra class licensees were required to pass the 5 WPM Element 1 Morse code test.

⁵ A 2003 survey by the Non-Profit Times found the average executive earned about \$84,000.

⁶ Based on the American Red Cross 2004 IRS filing.

⁷ Based on the American Diabetes Association Annual Report for 2004 and the American Diabetes Association Consolidated Financial Statements for 2004.

⁸ Based on the Salvation Army Annual report of 2004.

The ARRL is both lionized and despised by its members – you can never please everyone, especially with regard to Morse code. Both sides are upset with ARRL over their presumed indifference to their particular causes. Accusations that the ARRL publication QST does not supply Technician class licensees with adequate support because the *only* part of the publication dealing with operations above 30 MHz is the long-time column *The World Above 50 MHz* is disingenuous. It, amongst other things, ignores the fact that the Technician class, as currently reported in FCC statistics, includes both Technician and previous Technician Plus class licensees⁹. It also ignores the recent *Microwavelengths* column, reviews of VHF and UHF equipment, articles on satellite communications, VHF antennas, SETI (including microwave and computer aided signal processing), 802.11 experiments at 2400 MHz, and VHF/UHF operating activities, all within the last 6 months. If one can assume that at least *some* Technicians are not full-fledged electronic engineers when first licensed¹⁰, then there are a series of recurring columns for newcomers, including The Doctor is IN. Hands-On Radio, and Getting to Know Your Radio that will also be of interest.

3. License Statistics

An examination of the data¹¹ on amateur radio licensing shows some interesting trends. Overall there has been a loss in amateur licensees since the peak in 2003. This can be attributed to the combination of death of licensees and failure to renew licenses exceeding new licensees, which has averaged about 1900 per month. It should be noted that these numbers are still much higher than they had been in the past. In 1984 the amateur population was 410,000, 61% of what it is today. A large amount of that growth is attributable to the adoption of the codeless Technician class. The plot below shows that the Technician class¹² was growing faster than the Novice class was losing membership. It was the *de facto* entry class even before the *Restructuring Report and Order* eliminated any new Novice licensees. The abrupt changes to most of the classes (but not the Novice), is due to *Restructuring*. The number of Advanced class licenses lost is close to

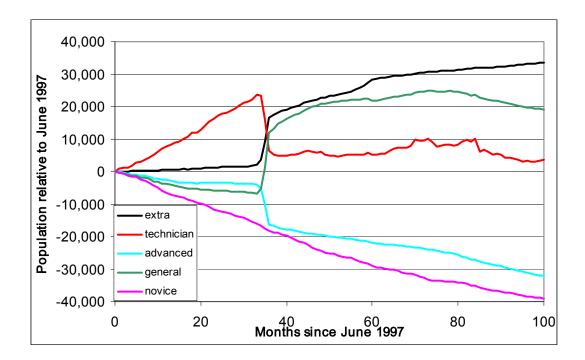
⁹ Previously listed Technician Plus licensees, and Technicians who have passed the Element 1 exam have the same HF privileges as Novice class licensees.

¹⁰ The Technician license is the current entry-level license, ignoring comments to the fact that any class license can be obtained at a single setting for an exam. If this were not true, then everyone would be an Amateur Extra class licensee – or at least all those who had passed the Element 1 exam. Those people who are concerned about having incentive licensing should consider that the Commission has decided, more than once, that we should have more than one class – in fact for the last 5 years, three classes – and have denied changing that situation in this NPRM&O.

¹¹ http://www.ah0a.org/FCC/index.html

¹² To eliminate excess confusion, the Technician and Technician Plus classes are combined in this plot, even though they had been treated separately before 2000.

the number of Amateur Extra class licenses gained, and the number of General class licenses gained is close to the number of Technician class licenses lost. It appears that the reduction of code testing to a single 5 wordper-minute level had the effect the Commission intended.



What is *more* interesting is that the Technician class license level is essentially flat, with current levels about what they were in early 1998. The only class that has shown consistent gain is the Amateur Extra class, and this is *with* Element 1 required.

4. Amateur Emergency Operations

Amateur radio operators, acting under the guidance of any number of emergency coordinating groups, report to areas where communications services are required due to acts of nature or man. The majority of local coordination is done with VHF/UHF mobile or handheld transceivers, while coordination for supplies and services from outside the affected area and for health and welfare messages are typically handled on HF. Line-of sight (LOS) on VHF/UHF for smooth earth (and 4/3 earth radius refraction) is approximately 10 km for a pair of 1.5-meter (~5 feet) high radios. This can be improved by erecting repeaters or base stations with antennas on high supports, assuming such supports have not been destroyed.

However, it has been discovered that diffraction at VHF/UHF can extend the normal range, assuming there are no close by objects that might block the

signal. In this case the issue becomes what is the necessary signal level or what is the available transmitter power level for particular circumstances. A useful tool for doing such evaluations is the Irregular Terrain Model (ITM). ITM predicts an 8.1 km range for smooth earth at 147 MHz with a 5 w 15 kHz FM radio with a vertically polarized omni antenna (assuming no head loss) with a 13 dB S/N for squelch opening and assuming a combined noise figure/loss at the antenna of 8dB. This actually improves to 28 km if terrain with 30m variation (plains) is considered and to 41 km (~25 miles) for average terrain (90m delta height). These values are statistical and are calculated over good soil for a 50% confidence level at 50% of the locations for 10% of the time.

For better reliability and more coverage in the region, HF is used. The typical antennas used are referred to as Near Vertical Incidence Skywave (NVIS)¹⁴ antennas, which provide coverage out to a typical range of 300 miles. NVIS antenna work by directing energy up at high angles to the ionosphere, where the signal is returned at a relatively high strength assuming the frequency is appropriately chosen. The typical frequency range for NVIS is 2-10 MHz, depending on the level of solar activity, with higher levels of ionization supporting the higher frequencies. If the frequency is too high it passes through the ionosphere, and this is the basis of ionospheric sounding. These antennas are referred to *affectionately* as cloud warmers in my part of the country, and have a long history of use in amateur circles¹⁵.

5. Filing Deadlines

There has been some questions about the filing deadlines, or more appropriately, how early filings could be made. The NPRM&O stated¹⁶: *Comment Dates.* Pursuant to Sections 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments on or before [60 days

¹³ U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA), Institute for Telecommunication Sciences (ITS) Irregular Terrain Model (ITM) (Longley-Rice).

¹⁴ NVIS antennas were designed by both the German and British Armies in World War II. For information on the British system see *Evolution of Near Vertical Incidence SkywaveCommunications and the Battle of Arnhem* by B.A. Austin, *IEE Proc. Sci. Meas. Technol.* **149**:2, March 2002

¹⁵ One of the best known NVIS antennas for fixed locations is the horizontal loop mounted at low height (20-50 feet) and popularized by Dave Fischer in *The Loop SkywireI* in QST November 1985. This type of antenna has been very popular in the QRP community, providing essentially omnidirectional coverage in azimuth. Requiring four supports, this is not the simplest antenna to use, although it has been a good performer slung through four trees for Field Day. A simple dipole, or even an inverted L formed by attaching a long wire to the whip of an automobile, and throwing it over a tree, will provide an NVIS antenna with suitable performance in emergencies.

¹⁶ NPRM&O at 54.

after publication in the Federal Register] and reply comments on or before [75 days after publication in the Federal Register].

If it wasn't clear from that, the ARRL issued¹⁷ a news release:

NEWINGTON, CT, Aug 2, 2005--Hundreds already have filed comments via the FCC's Electronic Comment Filing System (ECFS) on the Commission's recent proposal to eliminate the Morse code requirement for all license classes. A formal 60-day comment period starts once the FCC's Notice of Proposed Rule Making and Order (NPRM&O) in WT Docket 05-235 appears in the Federal Register, but all comments filed now are valid nonetheless...

CONCLUSION

As the period for comments and replies expires on this NPRM, we need to consider what needs to be done to ensure amateur radio in the future. One of the things that needs to be done is to heal the rift between proponents and opponents of Morse code testing. Inflammatory statements in these proceedings will not help that cause.

Marc A. Ressler

Member Institute of Electrical and Electronic Engineers

Prior holder of a First Class Radiotelephone license (let it expire when I no longer needed it)

Life Member Amateur Radio Relay League

Life Member Radio Amateur Satellite Corporation (AMSAT)

Life Member International DX Foundation

Life Member Ten-Ten International Net

Member QRP Amateur Radio Club International

Member Flying Pigs QRP Club International

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 $^{^{17}}$ From the ARRL Letter - Vol. 24, No. 30; August 5, 2005. This is an electronic service providing e-mail copies of ARRL related events.